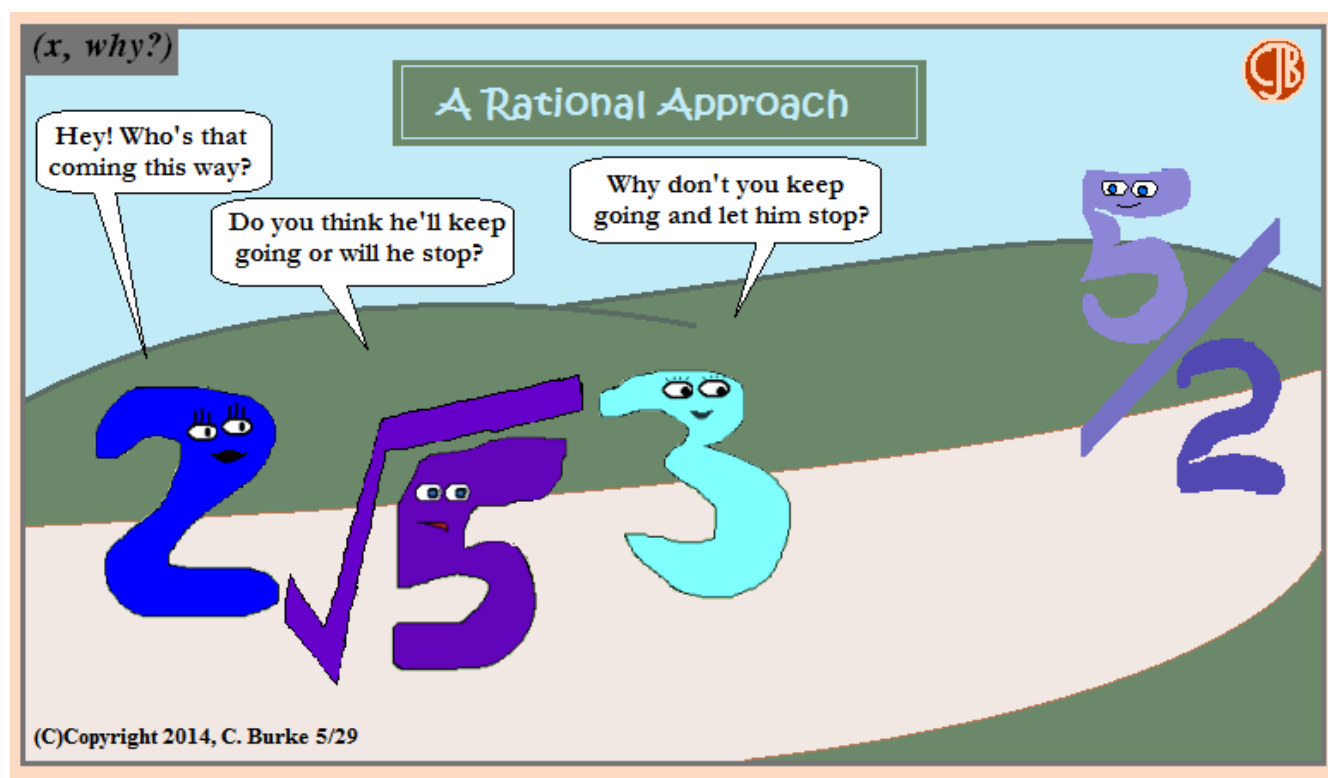


# Chapter 2 Booklet

## Rational Numbers & Square Roots



Name: \_\_\_\_\_

Due Date: \_\_\_\_\_

## MATH 9 – RATIONAL NUMBERS & SQUARE ROOTS REGULAR ASSESSMENT RECORD

Category	Topic	Due Date	Mark
2.1	<b><i>Comparing and Ordering Rational Numbers</i></b>		
	Pg. 51/52 Q. 4, 6, 8, 12, 14, 16, 17		
	Pg. 53/54 Q. 19, 22, 23, 24, 25, 26, 27, 28		
2.2	<b><i>Problem Solving with Decimal Rational Numbers</i></b>		
	Pg. 60/61 Q. 4, 6, 9, 11, 13, 15, 20, 21, 22		
	Pg. 62 Q. 23, 27, 28		
2.3	<b><i>Problem Solving with Fraction Rational Numbers</i></b>		
	Pg. 68/69 Q. 6, 8, 9, 10, 13, 14, 16, 17		
	Pg. 70 Q. 18, 21, 24, 26		
2.4	<b><i>Determining Square Roots of Rational Numbers</i></b>		
	Pg. 78/79 Q. 2, 6, 8, 9, 11, 12, 13, 15, 16, 18, 20		
	Pg. 80 Q. 22, 24, 25, 26, 28, 29, 30		
	Pg. 81 Q. 31, 33, 34, 35, 36		
Review	Pg. 82/83 Q. 1 – 25		

At the end of this unit you will be assessed on the following:

- ☐ 1. I can define “rational number” and give an example
- ☐ 2. I can convert fractions to decimals and vice versa
- ☐ 3. I can order rational numbers using diagrams, number lines, equivalent fractions, and technology
- ☐ 4. I can find a rational number between 2 given rational numbers using diagrams, number lines, equivalent fractions, and technology
- ☐ 5. I can use order of operations to evaluate expressions involving rational numbers (BEDMAS) with and without technology (common calculator with a fraction button)
- ☐ 6. I can determine the square root of a perfect square without technology
- ☐ 7. I can estimate (find an approximation of) the square root of a non-perfect square without technology
- ☐ 8. I can determine the square root of a positive rational number with technology
- ☐ 9. I can determine a positive rational number given the square root of that number
- ☐ 10. I can identify an error in a simplification of an expression involving rational numbers or square roots

## 2.1 Comparing and Ordering Rational Numbers

### Rational Numbers

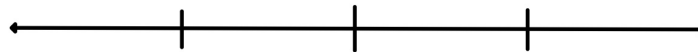
- > A number which can be expressed as a quotient of integers (a fraction)  $\frac{a}{b}$  where  $b \neq 0$
- > Mixed Numbers, fractions, whole numbers, integers and some decimals are considered rational numbers.
- > Decimals must either repeat or terminate.
- > If a decimal number does not repeat and does not terminate, it is classified as irrational.

Examples:

Use a benchmark to determine the location of the point on the number line.

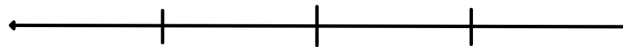


Determine the location of  $\frac{7}{13}$ ,  $\frac{5}{11}$ , &  $\frac{9}{32}$



Determine the location of  $-\frac{4}{7}$ ,  $-\frac{11}{17}$ , &  $-\frac{5}{13}$

Try Questions:



Place the following numbers on the number line:

$0.25$ ,  $\frac{3}{8}$ ,  $-0.38$ ,  $\frac{7}{16}$ ,  $0.8$ ,  $-\frac{1}{3}$ ,  $\frac{3}{5}$ ,  $0.13$ ,  $\frac{5}{6}$ ,  $0.625$

**Example 3: Identify a Rational Number Between Two Given Rational Numbers**

Identify a fraction between  $-0.6$  and  $-0.7$ .

**Solution**

You can first identify a decimal number between  $-0.6$  and  $-0.7$ , using a number line.



One decimal number between  $-0.6$  and  $-0.7$  is  $-0.65$ .

Convert the decimal to a fraction.  $-0.65 = -\frac{65}{100}$

A fraction between  $-0.6$  and  $-0.7$  is  $-\frac{65}{100}$ .

What is another way to express  $-\frac{65}{100}$  as a fraction?

**Key Ideas:**

- 1) Use benchmarks to compare and order rational numbers.
- 2) You can change fractions to decimals to help you to compare.
- 3) When comparing negative rational numbers, the larger ones are closer to zero.
- 4) When estimating fraction operations, round using benchmarks.

**Practice Problems:**

2.1 Comparing & Ordering Rational Numbers, Pages 51 – 54 DUE DATE: \_\_\_\_\_

Page 51, #4	Page 51, #6
Page 51, #8	Page 52, #12

Page 52, #14

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## 2.2 Problem Solving with Decimal Numbers

### Estimations

Decimals : Complete a quick rounding of the number,  
then perform the operation

Addition, Subtraction,  
and Multiplication: Round all of the numbers to a  
"one non zero" number  
then perform the operation.

$$\begin{array}{r} 37.6521 + 73.4179 \\ 40 + 70 = 110 \end{array}$$

$$\begin{array}{r} 0.27965 - 0.0387 \\ 0.3 - 0.04 = 0.26 \end{array}$$

$$\begin{array}{r} 2.976 \times 7.3287 \\ 3 \times 7 = 21 \end{array}$$

$$\begin{array}{r} 4231.9521 \times 5867.468 \\ 4000 \times 6000 = 24000\,000 \end{array}$$

$$\begin{array}{r} 0.039768 \times 0.007165 \\ 0.04 \times 0.007 = 0.00028 \end{array}$$

Try Questions:

Estimate  $3.8765954 + 2.394776895$

Estimate  $3.8765954 \times 2.394776895$

Estimate  $0.00518496 + 0.0194872$

Estimate  $57.92845 - 41.8540389$

Estimate  $784.958 \times 569.58348$

Estimate  $0.048762 - 0.0194763$

Estimate  $0.004589 \times 0.0789648$

Estimation:

- Division → Round the divisor to a "one non zero" number.  
→ Round the dividend to a multiple of the divisor.  
(closest to the current number)  
→ If the divisor is less than 1, adjust your decimal places  
→ Divide

$327.69821 \div 7.695$

$8 \overline{) 320} = 40$

$0.67925 \div 0.00821569$

$0.008 \overline{) 0.64} \rightarrow 8 \overline{) 640} = 80$

Try Questions:

Estimate  $387.65954 \div 7.4932$

Estimate  $0.01983 \div 0.4692$

## Solving Problems – Examples:

### Mean (Average)

The temperature over a 5 day period was recorded

3.7°, 9.6°, 7.6°, 8.5°, 11.4°

Determine the average temperature

### Rate of Increase / Decrease

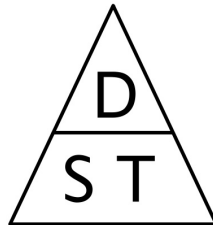
As a plane ascends into the sky, the air temperature decreases at a rate of 0.57°C per 100 m of elevation. If the temperature on the ground is 18.5°C, what is the temperature where the plane is flying at 1700m?

### Distance , Speed , Time

$$D = S T$$

$$S = \frac{D}{T}$$

$$T = \frac{D}{S}$$



Speed = 80 km/h  
Time = 3 h

What distance have you travelled?

D =

Jason drives from Edmonton to Grande Prairie at an average speed of 95 km/h . The distance from Edmonton to Grande Prairie is 532 km. On the return trip, Jason has an average speed of 92 km/h. How much longer did it take for Jason to return to Edmonton than to go to Grande Prairie?



Try Questions:

A submarine is currently 120 m under the surface of the ocean. It begins to ascend at a rate of 16 m/s for 4 seconds. Determine the depth of the submarine after 4 seconds.

After reaching the depth above, the submarine slows its rate of ascent to 10 m/s. Determine the length of time the submarine will take to reach the surface of the ocean.

**Practice Problems:**

2.2 Problem Solving with Decimal Numbers, Pages 60 – 62

DUE: \_\_\_\_\_

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Page 62, #28

## 2.3 Problem Solving with Fraction Numbers

### ESTIMATING FRACTIONS

\*Use Benchmarks

\*Round the Fractions

\*Perform the Operation

(+, -, ×, ÷)

e.g.  $\frac{3}{7} + \frac{2}{9}$

Round to:  $\frac{1}{2} + \frac{1}{4} =$

e.g.  $-\frac{15}{19} \times \frac{4}{9}$

Round to:  $-\frac{3}{4} \times \frac{1}{2} =$

e.g.  $5\frac{7}{8} - 2\frac{3}{16}$

Round to:  $6 - 2 =$

Try Questions:

$$\frac{3}{7} + \frac{4}{11} + \frac{1}{5}$$

$$\frac{13}{17} - \frac{9}{13}$$

$$\frac{17}{21} \times \frac{31}{43}$$

Examples:

### Problem Solving with Fractions

- Determine the operation required
- Use the appropriate calculator function



Joni earned \$36 babysitting for a family friend. On the weekend, she went to the mall with her friends. She spent  $\frac{1}{4}$  of her money on some hair accessories. She spent  $\frac{1}{3}$  of her money on a blouse and  $\frac{1}{6}$  on lunch. How much money did she spend? What fraction of her money did she have left?



At a local discount store, jeans were on sale for  $\frac{1}{4}$  off. Every week that the jeans were still in stock, the store reduced the jeans by another  $\frac{1}{4}$  of the current price. Determine the cost of a pair of \$128 jeans after 6 weeks of sales.



One eighth of a tree's height is measured in its trunk.  
 The remaining part of the leaf covered tree is 17.5 m tall.  
 How tall is the trunk of the tree?  
 How tall is the tree?



Marty has a collection of old coins from 5 different countries.  
 $\frac{1}{3}$  of the coins are from England,  $\frac{1}{6}$  are from Switzerland,  $\frac{1}{4}$  are from France,  $\frac{1}{8}$  are from Italy, and 9 are from Spain.

How many coins are in the collection?  
 How many coins are from each country?



2.3 Problem Solving with Fraction Numbers, Pages 68 – 70 DUE: \_\_\_\_\_

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Page 70, #26

## 2.4 Determining the Square Roots of Rational Numbers

### Square Roots

Every number has two square roots.

The square roots may be rational. e.g. The square roots of 25 are -5 and 5.

The square roots may be irrational e.g. The square roots of 17 are -4.1231... and 4.1231...

$\sqrt{6.25}$  means use the positive answer  $\rightarrow 2.5$

$-\sqrt{6.25}$  means use the negative answer  $\rightarrow -2.5$

$\pm\sqrt{6.25}$  means use both answers  $\rightarrow \pm 2.5$

Write all the perfect squares from 1 – 100

Use benchmarks to estimate square roots.

Estimate these Square Roots

$$\sqrt{23} \qquad \sqrt{111} \qquad -\sqrt{38}$$

$$\sqrt{70} \qquad \sqrt{6} \qquad -\sqrt{63}$$

$$\sqrt{55} \qquad \sqrt{41} \qquad \pm\sqrt{95}$$

To determine the square root of fractions, split the fraction and find the square root of the numerator and then find the square root of the denominator.

Determine the Square Root of the Fractions

$$\sqrt{\frac{4}{9}} \qquad -\sqrt{\frac{121}{36}} \qquad \pm\sqrt{\frac{49}{81}}$$

## Using your calculator properly

Determine the result

$$\sqrt{9} + \sqrt{4}$$

$$\sqrt{9+4}$$

$$\sqrt{9} - \sqrt{4}$$

$$\sqrt{9-4}$$

Determine the result

$$\sqrt{9} \times \sqrt{4}$$

$$\sqrt{9 \times 4}$$

$$\sqrt{9} \div \sqrt{4}$$

$$\sqrt{9 \div 4}$$

What do you notice about the results?

Examples using square roots:

Determine the result

$$\sqrt{9+8} - \sqrt{4+7} + \sqrt{3 \times 5}$$

$$\sqrt{9-3 \times 2+7} \div \sqrt{4} + 1$$

Determine the Result

$$\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{235876094}}}}}$$

## Problems:

$$A = 675 \text{ m}^2$$

The length of the rectangle is 5 times the width

Determine the dimensions of the rectangle

$$A = 784 \text{ m}^2$$

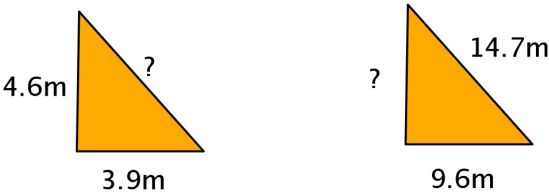


Determine the dimensions of each square

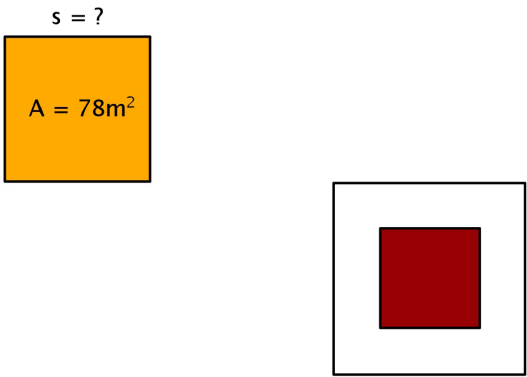
Be sure to know the difference between the square of a number and the square root of a number.

Number	Square	Square Root
1	1	1.000
2	4	1.414...
3	9	1.732...
4	16	2.000
5	25	2.236...
6	36	2.449...
7	49	2.646...
8	64	2.828...
9	81	3.000
10	100	3.162...
11	121	3.317...
12	144	3.464...
13	169	3.606...
14	196	3.742...
15	225	3.873...
16	256	4.000
17	289	4.123...
18	324	4.243...
19	361	4.359...
20	400	4.472...
21	441	4.583...
22	484	4.690...
23	529	4.796...
24	576	4.899...

Using Square Roots



Using Square Roots



2.4 Determining the Square Roots of Rational Numbers, Page 78 – 81      DUE: \_\_\_\_\_

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